

THE WESTERN AUSTRALIAN SPECIES OF XYRIS

By N. A. WAKEFIELD, Noble Park, Victoria.

During the past several years, a survey has been carried out of the Australian representatives of the genus *Xyris**; and, while the aggregate of literature on the subject provides a satisfactory classification of the eastern and northern Australian species, those of temperate Western Australia have not been adequately dealt with.

All *Xyris* species which are known from the temperate part of Western Australia are apparently endemic in the comparatively small 200-mile-long near-coastal belt from about Albany to the Margaret River area†. Three of these species (*X. lanata*, *X. lacera* and *X. flexifolia*) were named by Robert Brown in *Prodromus Florae Novae Hollandiae*: 256-257 (1810), and Mueller dealt with a further two (*X. laxiflora* and *X. gracillima*) in *Fragmenta Phytographiae Australiae*, VIII: 203 (1874). Of these five species, a very small aggregate of specimens had been collected to provide material for the classification set out by Bentham in *Flora Australiensis*, VII: 76-81 (1878).

Recently, the present writer came across two Western Australian collections of *Xyris*, representing apparently an undescribed species, closely resembling *X. gracillima* but differing in two important details. As the latter was known only from its type collection, there was the possibility that it represented an aberrant form. Examination of the *Xyris* material of the State Herbarium, Perth, revealed a second collection true in all details to the original *X. gracillima*, and also material of two more undescribed species.

In this paper, the 8 known species of the extreme south-west of Western Australia are dealt with in detail; and the three recorded from the north of the State (and two others which probably occur there) are also noted. These last five species are eventually to be included elsewhere in a detailed treatment of the eastern and tropical Australian species, and are mentioned here so that the present paper will cover, as far as knowledge to date goes, all Western Australian members of the genus.

The fact that three species of *Xyris* have each been collected once only in Western Australia indicates the need for further

* The genus has no widely used common name; the vernacular for the group, as given in the Field Naturalists Club of Victoria *Census of Victorian plants* is "Yelloweye", but the name was probably coined by the Plant Names Sub-Committee of the Club.

† A. B. Rendle, in the *Journal of Botany*, 37: 501-504 (1899), cited "Swan River" for several collections, but this would refer to the whole original colony and not to the present specific locality. If the 'Lucky Bay' location for Robert Brown's *X. teretifolia* (Bentham) is correct, then the range of the group is more than doubled, and extends well into the low rainfall area. It is not considered that the 'Champion Bay' specimen of *X. lanata* R. Br. could have come from the Geraldton district.

field work on the genus in that State. It is hoped that this paper will serve as a guide for such investigation.

Bentham (*l.c.* p. 76) may be referred to for the general characters of the genus, or they may be seen in the illustrations with this paper. Entirely different types of capsules indicate natural groups in the Australian species; and the placentation may be consistent within each of these groups, though in many species insufficient specimens are available at corresponding stages of maturity to prove this. The two distinct types of anthers provide a most clear-cut division, and shape and size of this organ relative to the filament is constant within each species. Other stable specific characters are the degree to which the style is cleft, the shape of the petal (often lost however in herbarium specimens), and the nature of the bracts and lateral sepals ("bracteoles"—Bentham).

The following key uses the above features; and no skilled technique is required for the simple dissections to observe them. Vegetative details are avoided as unreliable key features; for, while leaf-blades are consistently present in many species, they may be either present or absent within others, while the cross-section and surface of the scape often vary considerably also. Size of many external characters varies extremely, and the measurements given here in the descriptions of the species are of the maximum sizes noted.

KEY TO THE *XYRIS* SPECIES OF TEMPERATE WESTERN AUSTRALIA

(The accompanying illustrations portray all features used in the key.)

In all these species the apex of the capsule is hard and indehiscent.

- A.—Anther-cells distinct; staminodes densely penicillate.
 - B.—Apex of capsule smooth; bracts plumose 1. *X. lanata*
 - B.—Apex of capsule scabrous; bracts glabrous ... 2. *X. laxiflora*
- A.—Anther-cells confluent; staminodes absent or glabrous.
 - C.—Bracts distinctly lacinated or toothed.
 - D.—Bracts round; style undivided 3. *X. lacera*
 - D.—Bracts oblong; style 3-fid 4. *X. flexifolia*
 - C.—Wings of bracts normally entire.
 - E.—Style cleft halfway to base.
 - F.—Staminodes absent; basal sheaths acute
..... 5. *X. roycei*
 - F.—Staminodes present; basal sheaths obtuse
..... 6. *X. gracillima*
 - E.—Style little or not cleft.
 - G.—Style entire; anther-lobes sub-equal ... 7. *X. indivisa*
 - G.—Style 3-fid; anther-lobes very unequal
..... 8. *X. inaequalis*

SUMMARY OF SPECIES

The location of the specimens cited hereunder are abbreviated as follows:

MEL—National Herbarium of Victoria, Melbourne.

NSW—National Herbarium of New South Wales, Sydney.

PERTH—Western Australian State Herbarium, Perth.

I am indebted to the Government Botanists and members of the staffs of these institutions for the opportunity to examine the material concerned.

Duplicates of a number of these specimens and some additional ones are in the British Museum or Kew, England. Some of these are cited by Bentham and most by Rendle. Those which give further locality records are quoted below.

1. *Xyris lanata* R.Br.

Rootstock perennial; leaves few, to 35 cm. long and 1.5 mm. broad, the sheaths with dark keels; scapes terete, to 75 cm. tall and 1.5 mm. in diameter; spikes oblong, about 1.5 cm. long and 1 cm. broad; braets seriate, dull, the empty ones numerous strap-like concolourous and hirsute at the apex, floral ones oblong pale with dark wings and the upper margins hirsute; lateral sepals narrow, the apex hirsute, the keel denticulate; petals broad; stamens small, anther-cells separated, filament about the same length; staminodes penicillate; ovary with a large hard smooth apex; capsule fragile beneath the hard detachable apical cap.

BOW RIVER—S. W. Jackson, 10/1912 (NSW). ALBANY—W. V. Fitzgerald, Nov. 1907 (NSW); "R.H.", 12/1898 (PERTH); C. A. Gardner, 6 Nov. 1927 (PERTH). KING GEORGES SOUND—Oldfield 575 (MEL); Webb (MEL); Mueller (MEL); J. H. Maiden, Nov. 1909 (NSW). NEAR STIRLING RANGE—J. Forrest, Nov. 1881 (MEL). GRANITE BAR—R. H. Pulleine, 12/1917 (NSW). BETWEEN NANNUP AND NILLUP—R. D. Royce, 24/10/1948 (PERTH). Without locality — E. Pritzel, 11/1901 (NSW); Preiss 2222 (MEL, NSW); J. Drummond 257 (MEL). (Also "CHAMPION BAY, Bower"—Rendle.)

2. *Xyris laxiflora* F. Muell.

"Rootstock annual" (Bentham); leaves flat, to 12 cm. long and 1.5 mm. broad, the outer ones shorter, the sheaths short and broad; scapes terete, flexuose, very slender, to 40 cm. tall, the basal sheath up to 10 cm. long acuminate; spikes oblong, about 1.3 cm. long and 1 cm. broad; braets scarious, lower ones lanceolate blunt concolourous, upper ones oblong with dark wings and a pale triangular centre; lateral sepals narrow, acute, the keel prominent and shaggy, the wings with scaberulous margins; petals broad, elliptic; anthers small, on long filaments; staminodes penicillate; ovary with enlarged 3-lobed scabrous-pubescent apex.

SYNTYPES—J. Drummond Nos. 202, 355 (MEL). BETWEEN NANNUP AND NILLUP—R. D. Royce 2496, 24 Oct. 1948 (PERTH). "VASSE AND AUGUSTA RD.—Gilbert" (Rendle).

The following six species form a very distinct group having large anthers with the cells confluent at the apex as well as connate for most of their length. Moreover, staminodes are absent in all but one of the species, apparently by reduction, for those of the exception are glabrous. All other Australian species of the genus have the anther-cells separated on a connective and staminodes bearing jointed hairs. These six species are consistent also in having the 3-lobed scabrous-pubescent ovary which however occurs also outside the group in *X. laxiflora*.

3. *Xyris lacera* R.Br. (Syn. *X. teretifolia* R.Br.)

Rootstock robust but apparently annual; leaves few, smooth, elliptical in section, to 30 cm. long and 1.5 mm. broad, the outer ones shorter, the sheaths stout and short; scapes terete, up to 100 cm. tall and 2 mm. in diameter; basal sheath long with short blade; spikes large, about 1.5 cm. in diameter, globular; empty bracts few, narrow, coneolourous, irregular at the apex; floral bracts rounded, the basal half brown and shining, the upper half with semicircular pale centre and very lacerated dark wings; lateral sepals spathulate, the apex rounded and bifid with irregular margins, the keel prominent and denticulate; petal lamina round; anthers very large (3 mm. long), oblong, the filament very short and broad, cells connate, the apex rounded and confluent; staminodes absent; style long, undivided; ovary as in *X. laxiflora*.

KING GEORGES SOUND—F. Mueller, Oct. 1867 (MEL). MARBLUP RIVER (Wilsons Inlet)—Oldfield 741 (MEL). LAKE MUIR—F. Mueller, 14/12/1877 (MEL). CHORKERUP—Mueller, 18-20/12/1877 (MEL). TORBAY JUNCTION (Elleker)—Cecil Andrews, 22 Dec. 1902 (PERTH). SCOTT RIVER (South of Nillup, — R. D. Royce 63, 17 Jan. 1945 (PERTH). MARGARET RIVER—A. J. Hall, Jan. 1936 (PERTH). ALBANY—"R.H.", 12/1898 (PERTH). "AUGUSTA—Gilbert" (Rendle). "LUCKY BAY—R. Brown, the type of *X. teretifolia*" (Rendle); "Highly scabrid leaves and peduncles, very stiff terete leaves and smaller spikes" (Bentham).

4. *Xyris flexifolia* R.Br. (Syn. *X. aemula* Steud.)

Rootstock perennial; scapes very slender, twisted, striate, terete, to 40 cm. tall and .5 mm. in diameter, the sheaths to 7 cm. long broad blunt red-brown twisted; "sometimes a second sheath produced into a slender terete blade" (Bentham); spikes narrow-oblong, to 7 mm. long and 3.5 mm. in diameter; bracts narrow-elliptical, the centre pale, the wings dark and lacerated in the upper part; lateral sepals narrow-linear, entire, smooth; petal lamina narrow-elliptical; style cleft at apex into very short arms.

BOW RIVER—S. W. Jackson, 11/1912 (NSW). KING GEORGE'S SOUND—L. Preiss 2221, Duplicate of type of *X. aemula* (MEL, PERTH). BETWEEN PORONGORUP AND WILLYUNG—F. Mueller, Oct. 1867 (MEL).

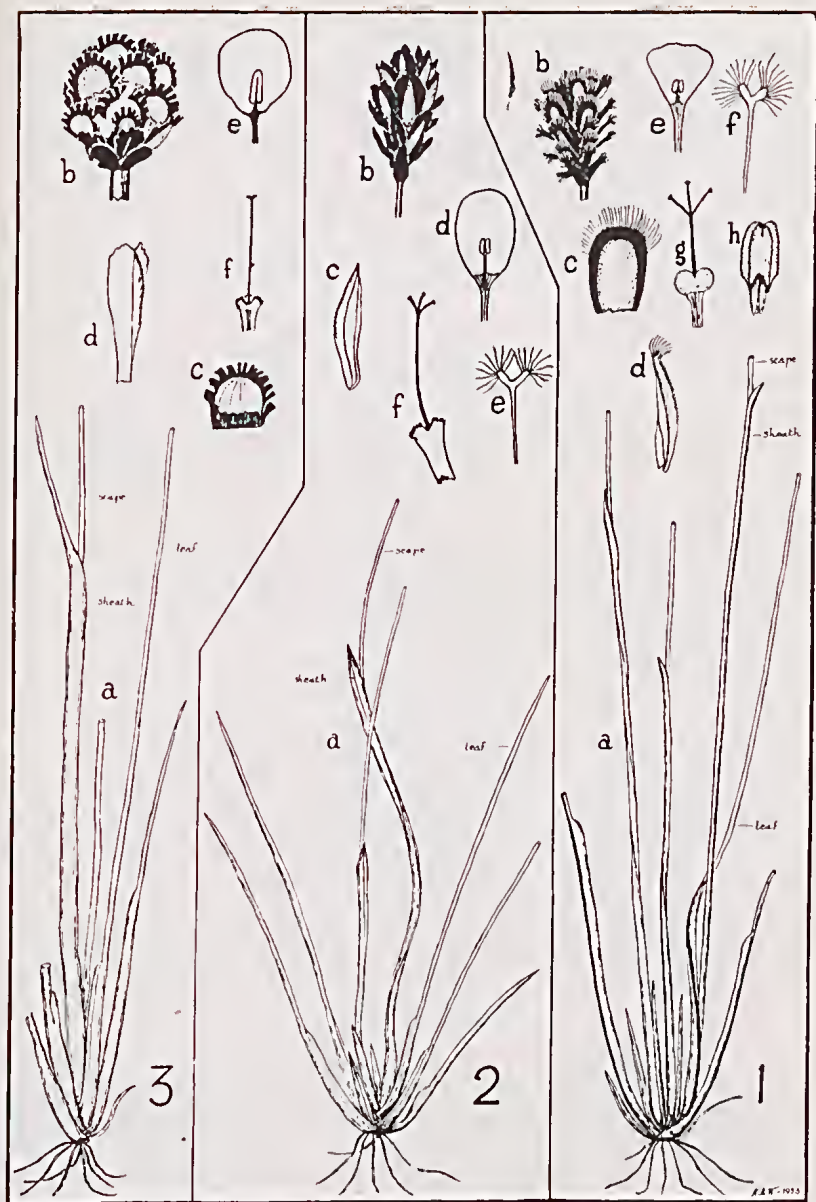


PLATE 1.

Fig. 1.—*X. lanata*—a, Rootstock and basal parts ($\times \frac{1}{2}$); b, spike (nat. size); c, bract; d, lateral sepal; e, petal and stamen; f, staminode; g, style and ovary; h, mature capsule. Fig. 2.—*X. laxiflora*—a, Rootstock and basal parts ($\times \frac{1}{2}$); b, spike (nat. size); c, lateral sepal; d, petal and stamen; e, staminode; f, style and ovary. Fig. 3.—*X. lacera*—a, Rootstock and basal parts ($\times \frac{1}{2}$); b, spike (nat. size); c, bract; d, lateral sepal; e, petal and stamen; f, style and ovary.

5. *Xyris roycei* sp. nov.

Scapi teretes, graciles, laeves glaberrimique; vagina acuminata. Spica subglobosa, circa 1 cm. longa; bracteae integerrimae, inferiores oblongae scariosae, intermediae (fertiles) latae bicoloratae. Sepala lateralalia angusto-oblonga, obtusa, integerrima, earina scabra. Petala lamina lata. Antherae magnae (circa 3 mm. longae), loculis ad apicem confluentibus, filamentum perbreve. Stylus ad medium divisus. Ovarium apice trilobum asperumque.

HOLOTYPE: Plains south of Blackwood River between Nannup and Nillup, R. D. Royce 2938, 24 Oct. 1948 (PERTH, duplicate at MEL).

Scapes to 90 cm. tall and 1.5 mm. in diameter, basal sheath about 20 cm. long spirally twisted and tapered to an acuminate point; spikes to about 1 cm. in diameter; bracts rounded, pale with dark entire wings, lower ones narrow, spreading and concolourous; lateral sepals oblong, bifid, scabrous-keeled; petals broad; anthers large (about 3 mm. long); style cleft halfway to the base.

BETWEEN NANNUP AND NILLUP—There is only the one collection of this species, which is named in honour of the discoverer of this and other significant material of the Western Australian species of *Xyris*.

6. *Xyris gracillima* F. Muell.

Rootstock perennial; scapes "3 to 4 ft. tall" (Royce), terete, to about 1 mm. in diameter; sheaths loose, blunt, to over 10 cm. long, "a second sheath sometimes produced into a long filiform blade" (Bentham); spikes globular, up to 7 mm. diameter; bracts rounded, entire, with dark wings; lateral sepals oblong, entire, smooth, bifid; petals broad; staminodes dilated, glabrous; style cleft more than halfway to base.

NILLUP, on the Brockman Highway—R. D. Royce 3019, 30 Oct. 1948 (PERTH). Without locality—Drummond 199, the type (MEL).

7. *Xyris indivisa* sp. nov.

Scapi teretes, graciles, basi vagina obtusa. Spica globosa, circa 8 mm. lata; bracteae imbricatae, alis integerrimis, intermediae (fertiles) bicoloratae. Sepala lateralalia angusto-oblonga, integerrima, obtusa. Petala lamina lata. Antherae magnae, loculis ad apicem confluentibus, filamentum perbreve. Staminodia nulla. Stylus indivisus. Ovarium apice trilobum asperumque.

Ex affinitate *X. gracillima* sed stylo indiviso et staminodiis nullis.

HOLOTYPE: Karri Forest, swampy banks of the Shannon River, F. Mueller, 12/12/1877 (MEL., duplicate at PERTH).

Rootstock perennial; scapes to 80 cm. tall and 1.5 mm. in diameter; sheath loose, obtuse, a second sheath sometimes produced into a long filiform leafblade; spikes globular, up to 8 mm. in diameter; bracts rounded, entire, pale with dark wings; lateral

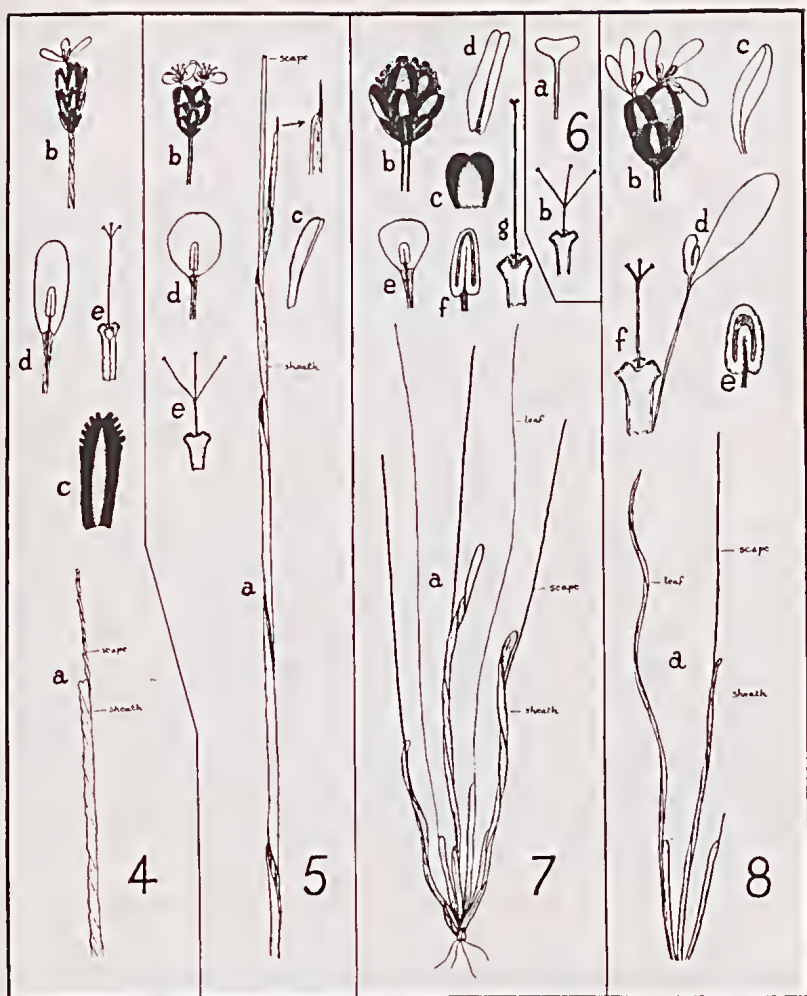


PLATE 2.

Fig. 4—*X. flexifolia*—*a*, Basal part of culm and sheath ($\times \frac{1}{2}$); *b*, spike (nat. size); *c*, bract; *d*, petal and stamen; *e*, style and ovary. (Details from Preiss 2221). Fig 5.—*X. roycei*—*a*, Basal part of culm and sheath ($\times \frac{1}{2}$); *b*, spike ($\times \frac{1}{2}$); *c*, lateral sepal; *d*, petal and anther; *e*, style and ovary. (Details from type specimen). Fig. 6.—*X. gracillima*—*a*, Staminode; *b*, style and ovary. (Details from type specimen). Fig. 7.—*X. indivisa*—*a*, Rootstock and basal parts ($\times \frac{1}{2}$); *b*, spike (slightly enlarged); *c*, bract; *d*, lateral sepal; *e*, petal and anther; *f*, stamen (outer view); *g*, style and ovary. (Details from Bow River specimen). Fig. 8.—*X. inaequalis*—*a*, Some basal parts ($\times \frac{1}{2}$); *b*, spike ($\times 2$); *c*, lateral sepal; *d*, petal and anther; *e*, anther (outer view); *f*, style and ovary. (Details from type specimen).

sepals oblong, smooth, the apex bifid; petals broad; anthers large; no staminodes; style undivided.

SHANNON RIVER—This type material has no leafblade.
BOW RIVER—S. W. Jackson, 11/1912 (NSW).

8. *Xyris inaequalis* sp. nov.

Folia angusta, complanata. Scapi teretes, graciles; vagina obtusa. Spica globosa, circa 4 mm. lata; bracteae imbricatae, alis intgerrimis, intermediae (fertiles) bicoloratae. Sepala lateraliter lata, integerrima, obtusa, carina denticulata, alis inaequalibus. Petala lamina angusta. Antherae parvae (circa 1 mm. longae), loculis ad apicem confluentibus atque quum apertis lobis valde inaequalibus. Stylus ad partem quintum trifidus. Ovarium ad apicem trilobum asperumque.

HOLOTYPE: Bramley, Margaret River District, R. D. Royce 1407, 8 Nov. 1946 (PERTH, duplicate at MEL).

Rootstock perennial; leaf-sheaths blunt, with blades (to 20 cm. long, 1 mm. broad, flattened) in younger plants only; scapes to 65 cm. tall, under 1 mm. in diameter, the largest ones slightly flattened, basal sheath blunt up to 25 cm. long; spikes up to 5 mm. long and 4 mm. in diameter; main bracts entire, round smooth, pale with dark wings, lowest ones eoneolourous; lateral sepals dilated with unequal entire wings, the dorsum denticulate; petals narrow; anthers short (about 1 mm. long), opening unequally with a very short outer lobe; style cleft at apex only.

BRAMLEY—The holotype material is a small specimen with leafblades, and some collected at the same time (isotype) is taller and lacks the leafblades. OSMINGTON, Margaret River District—R. D. Royce 2808, 14 Oct. 1948 (PERTH, duplicate at MEL). The latter material is very tall and lacks leafblades.

TROPICAL SPECIES

The tropical Western Australian species all have the capsule fragile and dehiscing along its entire length; the anther-cells are distinct, and there are ciliate staminodes present.

Xyris complanata R.Br. (Syn. *X. elongata* Rudge) is a stout perennial with the scapes and leaves normally very much flattened and with acute edges. It is however a polymorphic species with a number of synonyms, and ranges across tropical Australia, southeasterly to near Sydney, and northerly into the larger islands. In eastern Australia the scapes are sometimes narrower and scabrous (Syn. *X. scabra* R.Br.) or terete and smooth (Syn. *X. laevis* R.Br.); but the verrucose bracts with out-turned wings and the usually elongated spikes readily distinguish the species. It has been recorded from eleven localities in the north of Western Australia.

X. indica Linn. (Syn. *X. paludosa* R.Br.) and *X. pauciflora* Willd. (Syn. *X. denticulata* R.Br.) are known from Western Australia only from a single collection (of both together), made by W. V. Fitzgerald at Isdell River in May 1905. *X. indica* is a

coarser plant with leaves up to 6 mm. broad and transversely marked, and the scapes are rounded in section with 5 or 6 longitudinal channels; while *X. pauciflora* is more slender, with leaves up to 1.5 mm. broad, and scapes terete and striated. Both species range across tropical Australia and into south-east Asia.

It is most probable that two other much smaller annual species are native also in tropical areas of Western Australia, for they have been recorded in the Northern Territory and Queensland. *X. pusilla* R.Br. has broad short spreading leaves and the scapes are two-angled beneath the spike; and *X. oligantha* Steud. has erect narrow reddish leaves and the scapes 4-angled. Each is only a few inches in height.

WESTERN AUSTRALIAN PEARL SHELLS

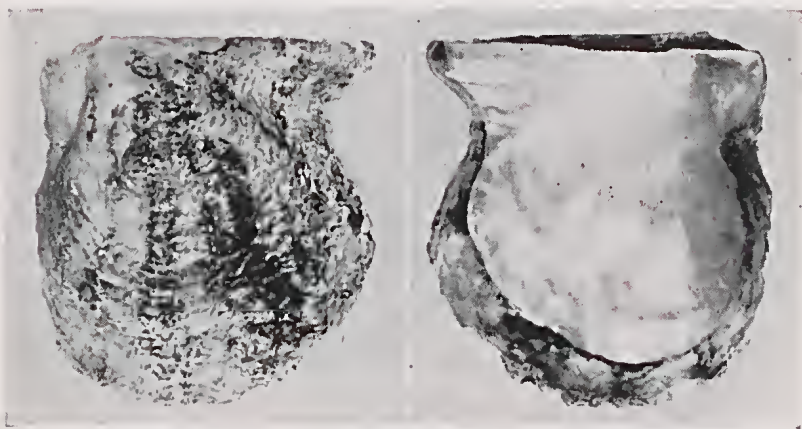
By BERNARD C. COTTON, The South Australian Museum, Adelaide.

The Pearl Shells belong to the family Pteriidae and there are four genera: *Austropteria*, with a long wing developed along the hinge; *Magnavicula*, with a shorter wing; *Pinctada*, without a wing, and *Electroma*, small and delicate, without a wing. The first genus, *Austropteria*, has not been recorded from Western Australia.

In Hedley's "A Preliminary Index of the Mollusca of Western Australia" (*Journ. Roy. Soc. W.A.*, vol 1, 1916), a dozen species appear under this family name.

Malleus malleus Linne, 1758. Coral Hammer. This is the coral reef species. *Malleus albus* Lamarck, 1819, the White Hammer, should be added as this is the Northern and North-western mainland species.

Malleus regulus Forskal, 1775. Bean Hammer. The species comes from the Philippines and belongs to the genus *Parimalleus*



Sharks Bay Pearl Shell, from Albany, natural size.